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# **Qualification and Certification – Tools to Increase Employment Case Study: Mechanization of Processes Involved in The Fabrication**

Nicea Mergeani and Ionel Dănuț Savu

Universitatea din Craiova, Facultatea de Economie și Administrarea Afacerilor, România, Universitatea din Craiova, Facultatea de Mecanică, România

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# QUALIFICATION AND CERTIFICATION – TOOLS TO INCREASE EMPLOYMENT CASE STUDY: MECHANIZATION OF PROCESSES INVOLVED IN THE FABRICATION

**Mergeani Nicea** (author for correspondence), Universitatea din Craiova,  
Facultatea de Economie și Administrarea Afacerilor, România,  
nicea.mergeani@icloud.com

**Savu Ionel Dănuț**, Universitatea din Craiova,  
Facultatea de Mecanică, România,  
disavu@yahoo.com

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## **Abstract**

*Qualification of personnel is a complex transformation of the workforce, which could be employed personnel, unemployed people or young graduates of EQF3 or EQF4 education system. Qualification is followed by certification, which is tool that is able to redraw the position of the workforce on the labour market, in full respect to the technical developments: mechanization, automation and robot. The paper presents the main elements related to the accessing of the qualification processes, taking as case study the situation of the welders who are replaced by mechanized devices. The welder becomes an operator and he is forced to access new qualification system, in order to receive the knowledge, the abilities and the competences which are necessary for the operating of the device. The structure of such qualification system is considered to be: definition of the qualification, access conditions, the curriculum for the training, examination conditions of the trained personnel and the type of the diploma to be offered to the trainee who passed the exams.*

**Keywords:** *qualification of personnel (J2), competences (J2), conversion welder – welding operator (J2), reduce unemployment (J6), qualification system structure, structural unemployment (J6).*

**JEL Classification:** *J2, J6.*

## **Introduction**

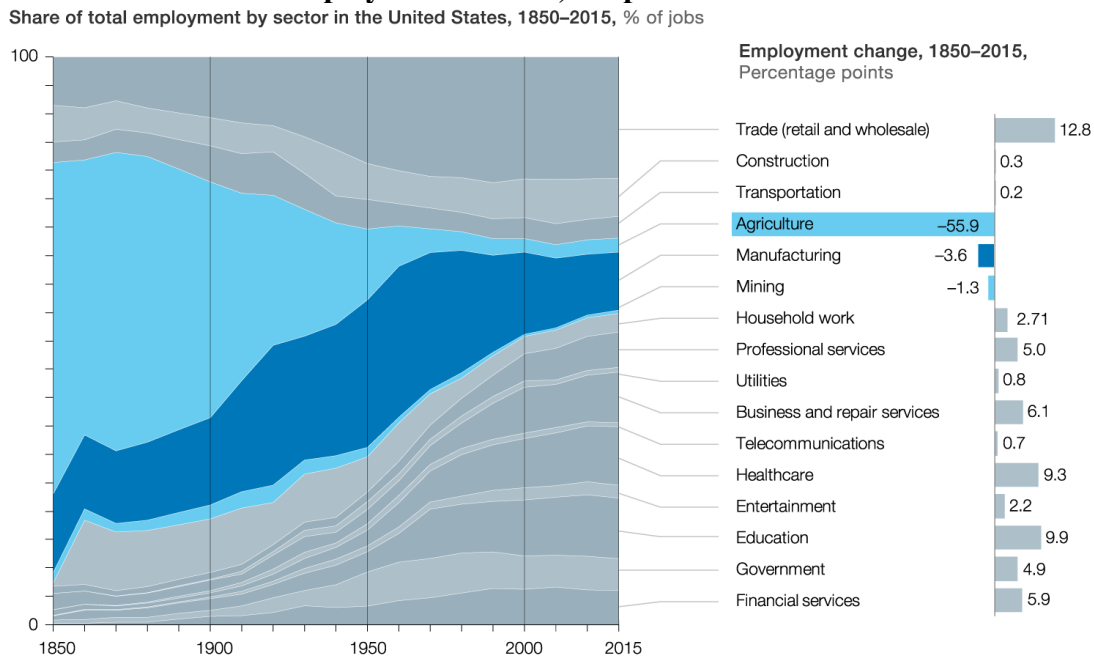
Nowadays, it is recorded a continuous and intense struggle in the battlefield of “productivity vs. employer”. Companies’ interest is in the way of quality and productivity increasing. The global social interest is strictly related to an assured existence, to safety and to the wage for the developed work. On this battlefield the victory seems to go to the companies which replace the hand work with the mechanized or automated or robot work. New concepts are topics of the discussions on these measures (Estelle Lagorce, Director, Global Partner Marketing at SAP Innovations introduced the two concepts during the second episode of the seria of 3, presented to Radio SAP together with experts of Deloitte, Coffee Break with Game Changers Radio): “muncreation” – increasing of the social component who brings creation in their work and “templosion” – accelerate

increasing of the bi-directional relation between the processing machine and the IT systems.

The alerts raised by the changes of the labour market trends, regarding the conditions of employee functioning (safety, wage, level of qualification, involvement, loyalty to the company, ...) are very often today. Year 2017 recorded important alerts mainly being related to the development of the artificial intelligence (AI). The peak of worry was marked by global responses to Canada's granting of a Canadian citizenship to a robot. Among the last moment alerts, two alerts are considered to be very important due to their consistency of the analytical support. The alerts are accompanied by potential solutions offered by the analysis houses who raised the alerts.

Global Management Consulting McKinsey Company raised in November 2017 alert on the future effects of the IA involvement in the labour market. It is concluded that about 375 million people should change their work, until 2030, due to the automation of the processes which are implemented in different fields (Manyika et al., 2017). A solution to that breakage of the labour market would be the modification of the thinking on the future of the workforce: lifelong learning and professional dynamics (changes of own qualifications and often changes of the jobs). The worst prognosis of McKinsey addresses about 800 million of employees that will be affected by the increasing of the level of mechanization / automation and robot in a future that means the next 2-3 generations. And that will be recorded not in the developed countries only, but in the developing countries, as well (Manyika et al., 2017). The analysis of McKinsey covers the American and the European and the Asian and the Australian continents and it considers more than 50 countries. Figure 1 shows the evolution of the share of total employment by sectors for the last 170 years.

**Figure No. 1 Evolution of the changes recorded by the distribution of the employment in USA, for period 1850-2015**



McKinsey&Company | Source: IPUMS USA 2017; US Bureau of Labor Statistics; McKinsey Global Institute analysis

Source: <https://www.mckinsey.com/global-themes/future-of-organizations-and-work/what-the-future-of-work-will-mean-for-jobs-skills-and-wages#part3>

The second study we intend to discuss here is a study performed by the independent European research company Pierre Audoin Consultants (PAC) for Fujitsu Company (FUJITSU EMEAI, 2017). The study was published in November 2017, as the previous presented. The study concluded that the new requirements of the workforce and the variable business environment bring negative influence to the productivity of the fabrication systems. The authors of the study consider that the actual condition for the safety of the work in a specific job, and the actual conditions for the safe keeping of the digital information, and the regional culture and habits specificities and the persistence of old technologies, together with the lack of capacity of the companies to introduce new technologies, lead to a conservation of the productivity level. And the limits of conservation are lower than the potential of the day. The study presents the issues met by the managers, there measures recording lower than expected impacts, due to the fact that the actual installed technologies play as obstacle for the development of the fabrication. The solution offered by the PAC consists of the initiation of a serious effort of the companies in the direction of the replacing the old technologies with new advanced and improved technologies, by mechanization and/or automation and/or robot applied on new fabrication technologies. The social effect which is related to the relation between the job and the employee, brought by such measures, is not commented in the study but left for the moment when will be recorded.

So, it could be launched a discussion on the increasing of the structural unemployment for the developed and the developing countries. The structural unemployment is one of the recognized components of the losing jobs phenomenon, which has among its main factors the restructuration of the fabrication system (Amadeo, 2017) by the introduction of specific devices dedicated to the replacement of the human factor of the workforce. The analysis performed to the level of the producers, as economical entities, the main jobs which suffered and it will suffer in short period replacement of the human factor with machines and/or devices are related to the welding, soldering, cutting, mechanical processing, plastic deformation or casting processes, together with the logistics operators who serve the numbered jobs.

The replacement of a welder can be total and in such situation all the welders in discussion will be replaced by one or several process surveillance operators (Savu, 2010), because the welders will be replaced by specific machines which are able to apply the technological process. In this case new category of personnel appears, the personnel who regulate the equipment.

Watching such process of replacement by far, it gives the idea of a dramatically increasing of the unemployment among the welders who are subjected to replacement. The idea seems to be false because the requests for welding specialists in Romania, from welder to welding engineer, is for the 8<sup>th</sup> year (Autoritatea Națională Pentru Ocuparea Forței De Muncă, 2017), consecutively, over the level of the fresh unemployment in the same field. The unemployment among the welders is predominantly a cyclic one, and it is mainly due to the bankruptcy of the companies.

Taking account of all these aspects, it keeps in the society a necessity of professional conversion of the people involved in the manual welding. They will remain on their jobs but having new duties and responsibilities. In the new system of fabrication they will act as operators who adjust the parameters on a machine and apply surveillance of the mechanized / automated process.

South and south-west regions of Romania met, starting with 2012, important transformations from this point of view. Examples of such transformation are many among the big producers from the region between Mehedinți – Argeș.

Ford Company introduced in Craiova about 200 of automated and robot fabrication positions, between 2008-2015. They were dedicated to the plastic deformation processes, to the painting processes and to the mastic deposition. In 2017 other 190 robots were implemented for the fabrication of the bodyworks and chassis for the new model EcoSport (Ford România, 2016). The company did not fired any welder, but applied reconversion of the welders, locksmiths and dyeing personnel into the controllers/adjusters of newly introduced equipment. More, the new facilities created for the named model, lead to the creation of 1700 new jobs, most of them for personnel to adjust the parameters of the equipment.

Dacia Renault Company recorded single robot in 2004 in the factory that produced the first generation of Logan model. The robot was dedicated to the deposition of mastic to the front and back windows. In the end of 2015, for the 464 welding shops dedicated to the car bodywork only, were used 47 robots and 167 devices dedicated to the mechanization and automation of the processes involved in fabrication (Alecă, 2012). So, about 10% of the welders should be involved in professional reconversion process, from welder to welding operator. In 2016, robots replaced 20% of the employee, so, it was necessary a cut of personnel from 14,000 to 13,200 (Gavril, 2015). In total, for the welding and plastic deformation processes, which are involved in the fabrication of the car bodywork, the automation level increased from 10% to 30% during the period 2014-2016 (Business Magazin, 2015). That meant 42 welders to lose their jobs, but they were converted to operators of the welding machine and surveyors of the automated welding processes.

A producer of heavy machines and devices from Craiova, started to update the technologies involved in its fabrication even from the crisis period, an during the period 2010-2012 involved in the fabrication new automated processing machines and equipment, expecting an increasing to double of the production (Alecă, 2015). The decision required the qualification of 30 existent or new employees to operate the welding equipment.

The shipyards from the S-V region of Romania approached lower volume of technology update. They mechanized several welding processes which are dedicated to the panels assembling and to the joining of two volume sections. In a study we organized, it has been observed that about 10 welders become welding operator in a year. For that conversion they require a training session before accessing qualification and certification.

So, the technological decisions and measures dedicated to the economic development of the companies subsequently involve a necessity of professional conversion of personnel from manual to operating personnel. Such conversion process is available if applied together with a harmonized qualification system, specific to the new position as operator.

A missing of the reconversion process, when involve new technologies in fabrication, will make the personnel and the population vulnerable to the change. The effect is similar to the changes brought by the crisis in 2009-2011 (Cristea și Dănciulescu, 2016). Specific to that period was an increasing of the unemployment due to the crisis and due to the lack of solutions to the crisis effects, in the conditions of fabrication which had predominantly manufacturing character. Only late, towards the end of 2011, the employers considered that a better qualification of their own personnel and an

improvement of the fabrication system could be solution to step forward from crisis (Mergeani și Dănciulescu și Dănciulescu, 2017). Year 2012 recorded new important programs of professional reconversion for the employed personnel or for the unemployed people.

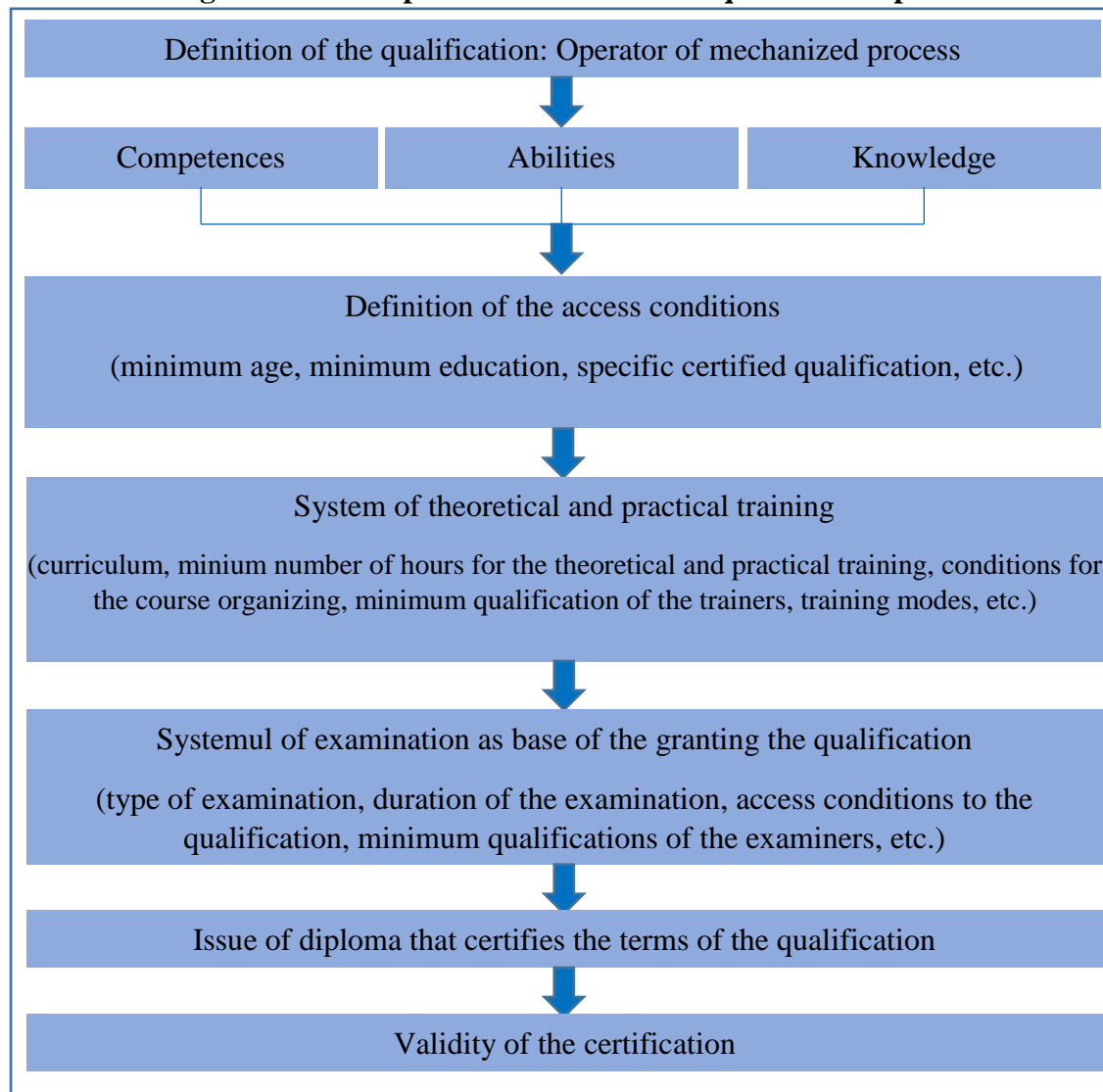
### **Qualification system for the operating personnel**

Regarding the reconversion of personnel a problem has been identified: lack of harmonization regarding the qualification conditions for large number of professions as welding, mechanical processing or plastic deformation.

The paper presents potential structure of a qualification procedure, methodology to lead to the certification, certification which could be recognized at least at national level.

Such procedure should start with the definition of the qualification. It should, also, to define the competences, the abilities and the knowledge which the person who access the qualification system should receive at the end of the process (figure 2).

**Figure No. 2 Proposed structure for the qualification procedure**



*Source: Developed by authors based on the research performed in 2017*

The definition of the competences, of the abilities and of the knowledge, that the operator of mechanized system should have, can be done after the classification of the qualification within the EQF system, only.

Because in a high school the competences have a general character and the knowledge is above the competences and skills, EQF 3 is not the appropriate choice for the proposed qualification. It is certain that EQF 4 is the most recommended, because it is related to the vocational training. So, everything starts with EQF 3 qualification, which is offered by high school education, and it goes to EQF 4, which is offered by specific training organized according to special curricula.

The competences that should be demonstrated by the personnel who was involved in the transformation from manual fabricator to operator of mechanized system are:

- Identification of a mechanized system by recognizing its components or by reading specific principle drawings
- Identification of a mechanized process by reading specific principle drawings
- Identification of the recommended application of the mechanized process
- Identification of a mechanized process result
- Selecting from a group of mechanized process of the process which offers the best result for specific application

The person who participated to a training cycle should be able to demonstrate series of abilities (practical capacities), as follows:

- Application of theoretical and practical knowledge in specific situations, having as result the capacity of adjust the parameters of the involved equipment / process and the capacity to apply surveillance on the involved processes
- Ability to intervene in the regime of operation, when the process becomes unstable
- Ability to intervene in a mechanized process when the result of the process are not according to the product specification.

Before prove the named competences and abilities, the person who fulfilled the EQF 4 training cycle, should demonstrate by examination:

- Knowledge of basic theoretical information which are related to the involved process
- Knowledge of basic theoretical information which are related to the devices and equipment involved in the mechanization of the process
- Knowledge of basic theoretical information which are related to the result of the process and its quality

Based on this construction of the qualification process structure, it will be defined a topic to be taught and a minimum number of hours, so the curriculum which will give the specific knowledge and competences and abilities required by the qualification. The curriculum depends on the nature of the process (welding, cutting, plastic deformation, mechanical processing, etc.). Basically, the worker who already has specific knowledge and competences due to the previous involvement in the manual processing, will require maximum 40 hours of training to shift from manual to mechanized processing and to become operator. The topic of the training should cover the main basic information of the process, even if the worker had that knowledge since applied the process in manual

regime. Over that information, extra information specific to the mechanization regime should be taught.

The examination of the trainee could be done by using the traditional methods related to EQF 4. It is obvious that changing from manual processing to mechanized processing, the examination will be focused on the revealing of the trainee's knowledge on the structure and the functionality of the machine to operate in the future, as certified personnel. Usually, the cause-effect relations are: manual regime – competences and abilities and mechanized regime – knowledge and competences.

If the new qualification is a continuous thing, with endless validity, the certification of the qualification should have specific period of validity, validity that depend on the dynamic of the technological improvements in the respective field. A period of 2-5 years is considered as opportune and realistic. When the validity is consumed, the certification can be prolonged with or without new training, with or without new examination. If the evolution of the technology is considered to be very important, then the methodology for the prolonging of validity should contain new training session and new examination of the trainee.

## **Results and discussions**

The proposed structure for the qualification process is a general frame for such methodology, which is applicable to any process that shifts from manual regime to mechanized regime. In that manner, all the workers subjected to such shifting could be trained and examined according to this frame procedure that can be customized according to the approached fabrication process.

By using simple training of maximum 40 hours, it will be possible the conversion of the personnel involved in fabrication from a manual regime, which is difficult and very complex to be applied and which depends very much of specific abilities, to a qualification that relates to the setting of a machine involved in a mechanized / automated / robot process.

The new certified qualification will be recognized without restrictions on all national and regional labour markets, due to the common agreed methodology used to qualify the personnel who is subjected to shifting from manual regime to mechanized regime. It will offer to that personnel the chance to perform repositioning on the labour market, by bringing higher qualification than had before, sometimes without leaving the company. The company will be able to set new improvements of its own fabrication system, without restrictions from the social legislation related to the unemployment.

The repositioning of the workforce according to this principle will improve the status of the employee on the next basis:

1. The labour that will develop in the new conditions (having the new qualification) will be more facile from the physical effort point of view, from the complexity of the operations to perform point of view and from the safety and health point of view.
2. The employer will increase the production and the quality of the products; in parallel the employer can maintain or even increase the salary of the repositioned personnel due to the higher chances to sell the products.
3. When the re-qualified personnel is not able to access a job for the same employer, that person can access other jobs on the labour market, because it has higher qualification than before, qualification which is required by the



labour market. That will increase the chances to relatively fast obtain a new job better paid than the manual regime job that is considered now old and not-necessary.

## Conclusions

Labour market is in continuous transformation, the main influencing factor being the shifting from manual regime of work to mechanized / automated / robot regime of work. Such transformation will produce an important volume of new unemployed people. That prognosis forced the expert of the labour market to raise alerts regarding the evolution of the employability on different sectors of the economy.

Personnel who perform manual regime work, which is not required by the labour market anymore, meets high chances to lose the job due to the replacement of the manual work with mechanized work, but it has the chance to access new qualification which will fix it on the old job for new conditions. The re-qualified person will become operator of the machine which replaced him during the improvement of the fabrication system by mechanization.

The re-qualification means to follow specific steps which are now considered as divergent from a national labour market to another. But, the steps can be elements of a common agreed methodology. Such methodology should contain specific components that refers to the definition of the qualification, the definition of the competences / skills / knowledge, the setting of the examination and the terms of the certification.

Persons who shifted from manual regime work to mechanized regime work has the chances of lower mistakes during work due to the introduction in cascade of new intelligent equipment for fabrication (industry 4.0, based on the digital processes and on the processes that contain artificial intelligence which gives the ability to produce random changes of the fabrication parameters). Such persons will have the possibility to access new jobs that can be better paid than the jobs characterized by manual regime work, with low productivity and quality due to the human errors in decision and manufacturing.

## References

1. Alecu, B. 2012. Dacia o ia pe urma Ford România: Zeci de roboți au fost instalați la Mioveni. *Ziarul Financiar*. Available at: <http://www.zf.ro/auto/dacia-o-ia-pe-urma-ford-romania-zeci-de-roboti-au-fost-instalati-la-mioveni-vezi-aici-cat-a-costat-automatizarea-si-cum-arata-acum-uzina-galerie-foto-10235989> [Accessed: 15th October 2017]
2. Alecu, B. 2015. Robotizarea uzinei Dacia Mioveni, la 15 ani de la prelucrarea de către Renault. *Ziarul Financiar*. Available at: <http://www.zf.ro/banci-si-asigurari/popeci-utilaj-greu-ia-5-mil-euro-de-la-ue-pentru-utilaje-6015773> [Accessed: 26th August 2017]
3. Amadeo, K. 2017. Seven Causes of Unemployment, [Online] Available from: <https://www.thebalance.com/causes-of-unemployment-7-main-reasons-3305596> [Accessed: 06th September 2017]
4. Autoritatea Națională Pentru Ocuparea Forței De Muncă. 2017. [Online] Available from: <http://www.anofm.ro/statistica> [Accessed: 26th September 2017]
5. Business Magazin. 2015. <http://www.businessmagazin.ro/analize/industrie/robotizarea-uzinei-dacia-mioveni-la-15-ani-de-la-preluarea-de-catre-renault-14523839> [Accessed: 25th August 2017]

6. Cristea, M., Danciulescu, A.-G. 2016. The Impact Of The Unemployment Rate On The Insurance Development In Romania. Statistical Approaches, Annals-Economy Series 1: 186-192.
7. Ford România. 2016. [Online] Available from: <http://www.ford.ro/Despre/Media/ComunicateDePresa/AnulCurent>
8. FUJITSU EMEAI. 2017. [Online] Available from: <http://www.fujitsu.com/fts/about/resources/news/press-releases/2017/emeai-20171107-enterprise-workplace-strategies-are-holding.html> [Accessed: 07th November 2017]
9. Gavril, V. 2015. Uzina Dacia Mioveni: Roboții vor lua locul angajaților. Plăți compensatorii de până la 100.000 lei. *România Liberă*. Available at: <http://romanalibera.ro/stiinta-tehnologie/auto/uzina-dacia-mioveni--robotii-vor-lua-locul-angajatilor--plati-compensatorii-de-pana-la-100-000-lei-383159?c=q2561> [Accessed: 25th August 2017]
10. Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, J., Batra, P., Ko, R. Sanghvi, S. 2017. GLOBAL MANAGEMENT CONSULTING MCKINSEY [Online] Available from: <https://www.mckinsey.com/global-themes/future-of-organizations-and-work/what-the-future-of-work-will-mean-for-jobs-skills-and-wages> [Accessed: 24th November 2017]
11. Mergeani, N., Danciulescu, A.-G., Danciulescu, R. 2017. Continuous education and training of adults – purpose of an active life on the labour market. Junior Scientific Researcher, Vol III, No. 2, pp. 9-18.
12. Savu, S.V. 2010. Imbinarea si microimbinarea in plasma de microunde a conductorilor electrici, Revista SUDURA, ISSN 1453-0384